

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2025

MAT1CJ101 - Differential Calculus(Major - I)

(FYUGP 2024 Admission onwards)

Time: 2 hours

Max. Marks : 70

PART – A

All questions can be attended.
Each question carries **Three** mark.

Ceiling -24 Marks

		COs	Knowledge Level (KL)	Marks
1	Check whether the function $F(x) = \frac{1}{x^2-1}$ is even or odd.	CO1	An	3
2	Suppose that $\lim_{x \rightarrow -2} p(x) = 4$, $\lim_{x \rightarrow -2} r(x) = 0$, and $\lim_{x \rightarrow -2} s(x) = -3$. Find: $\lim_{x \rightarrow -2} \frac{-4p(x)+5r(x)}{s(x)}$.	CO1	An	3
3	Determine the function $f(x)$ whose derivative is $6x$ and $f(1) = 0$.	CO1	An	3
4	Find the limit: $\lim_{h \rightarrow 0} \frac{3}{\sqrt{3h+1}+1}$.	CO1	An	3
5	Find dy/dx for the equation $x^2 = \frac{x-y}{x+y}$.	CO1	An	3
6	Find the center and radius of the circle $x^2 + y^2 + 4x - 6y - 3 = 0$.	CO2	An	3
7	a) Differentiate $f(x) = \frac{x}{x-1}$. b) Where does the curve $y = f(x)$ have a slope of -1?	CO1	An	3
8	Find the absolute maximum and minimum values of $f(x) = x^2$ on $[-2,1]$.	CO2	An	3
9	Find the function $f(x)$ whose derivative is $\sin x$ and whose graph passes through the point (0,2).	CO1	An	3
10	Graph the equation $y = \frac{-1}{2}x^2 - x + 4$.	CO1	An	3

PART – B

All questions can be attended.
Each question carries six marks.

Ceiling -36 Marks

		COs	Knowledge Level(KL)	Marks
11	Give an equation for the shifted graph of $y = x^3$ down 1 and left 1 unit. Then sketch the original and shifted graphs together.	CO1	An	6
12	State Sandwich Theorem and show that if $2 - x^2 \leq g(x) \leq 2 \cos x$ for all x , then $\lim_{x \rightarrow 0} g(x) = 2$.	CO1	An	6
13	Find the first and second derivatives of the function $u = \frac{(x^2 + x)(x^2 - x + 1)}{x^4}$	CO1	An	6
14	Find the following limits: a) $\lim_{x \rightarrow 1^+} \frac{\sqrt{2x}(x-1)}{ x-1 }$ b) $\lim_{x \rightarrow 1^-} \frac{\sqrt{2x}(x-1)}{ x-1 }$	CO1	An	6
15	Find the intervals on which $g(x) = -x^3 + 12x + 5$ for $-3 \leq x \leq 3$ is increasing and decreasing. Where does the function assume extreme values and what are these values?	CO2	Ap	6
16	As x moves from left to right through the point $c = 2$, is the graph of $f(x) = x^3 - 3x + 2$ rising, or is it falling? Give reasons for your answer.	CO2	Ap	6
17	Show that $\lim_{x \rightarrow -\infty} \frac{1}{x} = 0$.	CO3	An	6
18	Does the curve $y = x^4 - 2x^2 + 2$ have any horizontal tangents? If so, where?	CO3	An	6

PART - C

Answer any *one* questions.
Each question carries **Ten** marks.

		COs	Knowledge Level(KL)	Marks
19	a) Find an equation for the line perpendicular to the tangent to the curve $y = x^3 - 4x + 1$ at the point $(2, 1)$. b) What is the smallest slope on the curve? At what point on the curve does the curve have this slope? c) Find equations for the tangents to the curve at the points where the slope of the curve is 8.	CO2	Ap	10
20	a) State and Prove the Mean Value Theorem. b) For what values of a, m, and b does the function $f(x) = \begin{cases} 3, & x = 0 \\ -x^2 + 3x + a, & 0 < x < 1 \\ mx + b, & 1 \leq x \leq 2 \end{cases}$ satisfy the hypotheses of the Mean Value Theorem on the interval $[0, 2]$?	CO2	Ap	10

1 x 10 = 10 Marks

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE
First Semester B.Sc Degree Examination, November 2025
MAT1MN101- Calculus
 (FYUGP 2024 Admission onwards)

Time: 2 hours

Max. Marks : 70

Course Outcome Mapping Scheme

Q.NO	1	2	3	4	5	6	7	8	9	10
COS	CO1	CO1	CO1	CO1	CO1	CO2	CO2	CO3	CO3	CO3
Q.NO	11	12	13	14	15	16	17	18	19	20
COS	CO1	CO1	CO2	CO2	CO2	CO3	CO3	CO3	CO2	CO3

Section A

Answer any number of questions.

Each question carries 3 marks. Ceiling is 24.

- Find the slope of the function $f(x) = 2x^3 + x$ at $(2, 18)$.
- Given that the line $y = 2x$ is tangent to the graph of $y = x^2 + c$. Find c .
- Find the derivative of $f(x) = x^3(\sqrt{x} + 1)$.
- Find $\frac{dy}{dx}$ if $y = u^3 - u^2 + u + 1$ and $u = x^3 + 1$.
- Let $y = x^2 + 1$. Find the differential dy and use it to approximate Δy if x changes from 2 to 2.02.
- Define critical number of a function. Find the critical numbers of the function $f(x) = x^3$.
- Find the linearization of the function $f(x) = x^3 + 2x^2$ at $a = 1$.
- Find $\int \frac{\sin t}{\cos^2 t} dx$.
- Find $\int x^2(1-x)^7 dx$.
- Evaluate $\lim_{n \rightarrow \infty} \sum_{k=1}^n \frac{2k}{n^2}$.

Section B

Answer any number of questions.

Each question carries 6 marks. Ceiling is 36

11. Find an equation to the tangent line to the curve $x^2y + y^3 = 2$ at the point $(-1, 1)$.
12. A passenger ship and an oil tanker left port sometime in the morning; the former headed north, and latter headed east. At noon the passenger ship 40 mi from port and moving at 30 mph, while oil tanker was 30 mi from port and moving at 20 mph. How fast was the distance between the two ships changing at that time?
13. Show that the function $f(x) = x\sqrt{2x+1}$ on $[0, 4]$ satisfies the hypothesis of Mean Value Theorem and find all values of c that satisfies the conclusion of the theorem.
14. Find the relative extrema of the function $f(x) = x^4 - 4x^3 + 12$.
15. Find the points of inflection of $f(x) = (x-1)^{1/3}$.
16. State Mean value theorem for Integrals. Find the value c guaranteed by Mean value theorem for the integrals $f(x) = 4 - 2x$ on the interval $[0, 2]$.
17. Find the area of the region bounded by the curve $y = -x^2 + 4$ and $y = 3x + 4$.
18. Find the volume of the solid obtained by revolving by the region bounded by $y = \sqrt{x}$ and $y = x$ about the line $y = 2$.

Section C

Answer any one question.

Each question carries 10 marks.

19. Sketch the graph of the function $f(x) = \frac{x^2}{x^2-1}$
20. a). Find the length of the graph of $x = \frac{1}{3}y^3 + \frac{1}{4y}$ from $P(\frac{7}{12}, 1)$ to $Q(\frac{67}{24}, 2)$.
b). Find the surface area of the surface obtained by revolving the graph of $f(x) = \sqrt{x}$ on the interval $[0, 2]$ about x -axis.

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Reg. No:.....

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2025

MAT1MN102 - Calculus of a single variable

(FYUGP 2024 Admission onwards)

Time: 2 hours

Max. Marks : 70

PART – A

All questions can be attended.
Each question carries *Three* mark.

Ceiling -24 Marks

		C Os	Knowledge Level(KL)	Marks
1	Find $\lim_{x \rightarrow 2} \frac{5x^3+4}{x-3}$	3	C	3
2	Find $\lim_{x \rightarrow -\infty} \frac{4x^2-x}{2x^3-5}$	2	C	3
3	State Intermediate Value Theorem	1	C	3
4	Compute the slope of the function $y = x^2$ at the point $P(1,1)$	3	C	3
5	Find $\frac{dy}{dx}$ if $y = 3x^8 - 2x^5 + 6x + 1$	2	C	3
6	Find $f'(\frac{\pi}{4})$ if $f(x) = \sec x$	2	C	3
7	Evaluate $\frac{d}{dx}(\tan^2 x)$	2	C	3
8	Find $\frac{d}{dx}(\ln(x^2 + 1))$	2	C	3
9	Find the interval on which $f(x) = x^2 - 4x + 3$ is increasing and decreasing	1	C	3
10	Find all critical points of $f(x) = 4x^4 - 16x^2 + 17$	3	C	3

PART – B

All questions can be attended.
Each question carries six marks.

Ceiling -36 Marks

		COs	Knowledge Level(KL)	Marks
11	Find the one sided limits of the function $\frac{ x }{x}$ at $x = 0$. Does the limit exist?	1	C	6
12	Find $\lim_{x \rightarrow \infty} \frac{\sqrt{x^2+2}}{3x-6}$	2	C	6
13	Using the definition of derivative prove that $\frac{d}{dx} x^n = nx^{n-1}$	2	C	6

14	A stone is dropped from rest from a height of 200 meters. Its position function is given by $s(t) = 200 - 4.9t^2$. (a) Find the instantaneous velocity at $t = 3$ seconds (b) At what time does the stone hit the ground?	3	C	6
15	Find the derivative of the function $f(x) = \frac{x^2 e^x}{\ln(x)}$	3	C	6
16	Consider the function $f(x) = \frac{\sin x}{x}$, $x \neq 0$ and $f(0) = 1$. Is $f(x)$ continuous at $x = 0$. Justify	2	C	6
17	Let $f(x) = \begin{cases} x^2 - 1, & \text{if } x < 1 \\ 3, & \text{if } x = 1 \\ 2x - 1, & \text{if } x > 1 \end{cases}$ Is $f(x)$ is continuous at $x = 1$. Justify your answer.	2	C	6
18	Find $\frac{dy}{dx}$ if $x^2 + xy + y^2 = 7$	1	C	6

PART - C

Answer any *one* questions.

Each question carries **Ten** marks.

		COs	Knowledge Level(KL)	Marks
19	Let $f(x) = \sqrt{x}$ (a) Using the definition of derivative compute $f'(x)$ (b) Discuss the domain of $f(x)$ and $f'(x)$ (c) Explain what happens to the slope of the tangent of $f(x)$ as $x \rightarrow 0^+$	1	C	10
20	Consider the function $f(x) = x^3 - 6x^2 + 9x + 1$. (a) Find the critical points of $f(x)$ (b) Using the second derivative test, classify each critical points as a local maximum and local minimum.		C	10

1 x 10 = 10 Marks

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2025

MAT1MN103 - Basic Calculus

(FYUGP 2024 Admission onwards)

Time: 2 hours

Max. Marks : 70

Course Outcome Mapping Scheme

1	2	3	4	5	6	7	8	9	10
CO1	CO1	CO2	CO2	CO2	CO2	CO2	CO3	CO3	CO3
11	12	13	14	15	16	17	18	19	20
CO1	CO2	CO2	CO2	CO2	CO3	CO3	CO3	CO1	CO3

Section A (Short Answer Type Questions)

All questions can be attended. Each question carries 3 Marks. Overall ceiling 24 Marks.

- What is the domain and range of the function $f(x) = |x - 3|$.
- Write the expression $3[\ln x - 2\ln(x^2 + 1)] + 2\ln 5$ as a single logarithm.
- State the $\varepsilon - \delta$ definition of limit.
- Find the limit, $\lim_{x \rightarrow 4} \frac{\sqrt{x+5} - 3}{x - 4}$.
- Describe the intervals on which $f(x) = \cos\left(\frac{1}{x}\right)$ is continuous.
- Find the slope of the tangent line to the graph of $f(x) = x^2 - 9$ at $(2, -5)$.
- Find the absolute extrema of $f(x) = e^x \sin x$ on the interval $[0, \pi]$.
- State the first derivative test.
- Find $\int \left(\frac{x+1}{\sqrt{x}} \right) dx$.
- Write the limit $\lim_{\|\Delta x\| \rightarrow 0} \sum_{i=1}^n (3c_i + 10) \Delta x$, as a definite integral on the interval $[-1, 5]$.

(Ceiling 24 Marks)

Section B (Paragraph/Problem Type Questions)

All questions can be attempted. Each question carries 6 Marks. Overall ceiling 36 Marks.

11. Show that $f(x) = 2x^3 - 1$ and $g(x) = \sqrt[3]{\frac{x+1}{2}}$ are inverse functions of each other.
12. If $f(x) = 4 - x^2$, $g(x) = \sqrt{x+1}$ find $\lim_{x \rightarrow 3} g(x)$ and $\lim_{x \rightarrow 1} g(f(x))$.
13. State the intermediate value theorem. Verify that it applies to $f(x) = x^3 - x^2 + x - 2$ on $[0, 3]$ and find the value of c guaranteed by the theorem that satisfy $f(c) = 4$.
14. Test for continuity of $f(x) = \begin{cases} -2x & \text{if } x \leq 2 \\ x^2 - 4x + 1 & \text{if } x > 2 \end{cases}$. Describe the intervals on which the function is continuous.
15. Find the second derivative of $f(x) = 2x \sin x + xe^{2x}$.
16. The height of an object t seconds after it is dropped from a height of 300 meters is $s(t) = -4.9t^2 + 300$. Find the average velocity of the object during the first 3 seconds. Use the mean value theorem to verify that at some time during the first 3 seconds of fall, the instantaneous velocity equals the average velocity. Find that time.
17. Find the area of the region bounded by the graph of $y = 1 + \sqrt[3]{x}$, and the lines $x = 0$, $x = 8$ and $y = 0$.
18. State the second fundamental theorem of calculus and use it to find the derivative of $F(x) = \int_0^{x^3} \sin t^2 dt$.

(Ceiling 36 Marks)

Section C (Essay Type Questions)

Answer any one question. Each question carries 10 Marks.

19. (a) Find the inverse function of $f(x) = \frac{x+2}{x}$. State the domains and ranges of f and f^{-1} .
(b) Find $\frac{dy}{dx}$ where $\tan(x+y) = x$, and evaluate the derivative at $(0, 0)$.
20. Analyze and sketch the graph of $f(x) = 2x^{5/3} - 5x^{4/3}$.

(1 × 10 = 10 Marks)

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Reg. No:.....

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2025

MAT1MN104 - Mathematical Logic, Set Theory and Combinatorics

(FYUGP 2024 Admission onwards)

Time: 2 hours

Max. Marks : 70

PART – A

All questions can be attended.
Each question carries Three mark.

Ceiling -24 Marks

		COs	Knowledge Level (KL)	Marks
1	Negate the proposition "Every supercomputer is manufactured in Japan."	CO1	Analyze	3
2	Determine the truth value of $(\exists x) (\frac{1}{x} = x)$	CO1	Analyze	3
3	Find the power set $P(A)$ of the set $A = \{1,2,3\}$.	CO2	Evaluate	3
4	Let $A = \{x,y\}$, $B = \{1,2\}$, and $C = \{2,3,4,5\}$. Find $A \times (B \cup C)$.	CO2	Evaluate	3
5	Let $f(x) = x^3$ and $g(x) = \sqrt{x+1}$. Find $(f+g)(3)$ and $(fg)(3)$.	CO3	Evaluate	3
6	Today is Sunday. What day of the week will it be in 100 days from today?	CO3	Evaluate	3
7	Let $f(x,y) = x \bmod y$ and $g(x,y) = x \div y$ where x and y are positive integers. Find $f(17,6)$ and $g(17,6)$.	CO3	Evaluate	3
8	Find the number of ways of drawing a red king or a black king from a standard deck of playing cards.	CO3	Evaluate	3
9	Find 2-permutations of the elements of the set $\{w,x,y,z\}$.	CO3	Evaluate	3
10	Find the probability of obtaining at least one tail when three coins are tossed.	CO3	Evaluate	3

PART – B

All questions can be attended.
Each question carries six marks.

Ceiling -36 Marks

		COs	Knowledge Level (KL)	Marks
11	Verify that $\sim (p \vee q) \equiv \sim p \wedge \sim q$.	CO1	Evaluate	6
12	Construct truth table for $(p \vee q) \vee (\sim q)$.	CO1	Evaluate	6
13	Simplify the set expression $(A \cap B') \cup (A' \cap B) \cup (A' \cap B')$.	CO2	Evaluate	6

14	A survey conducted recently among 300 adults in Omega City shows 160 like to have their houses painted green, and 140 like them blue. Seventy-five adults like both colours. How many do not like either colour?	CO2	Evaluate	6
15	Find the number of positive integers ≤ 4000 and divisible by 7 or 8	CO3	Evaluate	6
16	Find the number of groups that can be formed from a group of 10 marbles if each group must contain at least 6 marbles.	CO3	Evaluate	6
17	A survey among 60 housewives about the two laundry detergents Lex and Rex shows that 30 like Lex, 35 like Rex, 10 like both, and 5 like neither. A housewife is selected at random from the group surveyed. Find the probability that she likes neither Lex nor Rex.	CO3	Evaluate	6
18	Let $A = \begin{bmatrix} 0 & 0 & 1 \\ 6 & 1 & 1 \\ 4 & 1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 5 & 2 \\ 2 & 3 & 0 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 2 & 1 \\ 6 & 1 & 1 \\ 3 & 2 & 0 \end{bmatrix}$. Determine $(A + B)C$.	CO3	Evaluate	6

PART - C

Answer any *one* questions.

Each question carries **Ten** marks.

		COs	Knowledge Level (KL)	Marks
19	(a) Show that $p \rightarrow q \equiv \sim q \rightarrow \sim p$. (b) Let A and B be two sets. Define relative complement of B in A . If $A = \{a, b, \dots, z, 0, 1, \dots, 9\}$, and $B = \{0, 1, \dots, 9\}$ find $A - B$ and $B - A$. Is $A - B$ equal to $B - A$?	CO1, CO2	Analyze, Evaluate	10
20	(a) Find the number of ways a committee of 2 students and 6 professors can be formed from a group of 5 students and 8 professors. (b) Seven marbles are drawn at random from a bag of 10 green marbles and 6 red marbles. Find the probability that four are green and three are red.	CO3	Evaluate	10

1 x 10 = 10 Marks

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Reg. No:.....

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2025

MAT1FM05(2) - Mathematics For Competitive Examinations - Part 1

(FYUGP 2024 Admission onwards)

Time: 1 ½ hours

Max. Marks : 50

Answer all questions. Each question carries One mark.

1. A trader has 50 kg of pulses, part of which he sells at an 8% profit and the rest at an 18% profit. He gains 14% overall. What is the quantity sold at an 18% profit?
(a) 20 kg (b) 30 kg (c) 40 kg (d) 50 kg
2. The average of six numbers is 30. If the average of the first five numbers is 28, what is the sixth number?
(a) 32 (b) 38 (c) 40 (d) 42
3. What is the unit's digit in the expression $127^{45} \times 346^{50}$?
(a) 2 (b) 8 (c) 6 (d) 4
4. Three bells toll at intervals of 12, 15, and 18 seconds, respectively. If they start tolling together, after how many seconds will they next toll together?
(a) 120 seconds (b) 150 seconds (c) 180 seconds (d) 240 seconds
5. A man spends 20% of his monthly salary on house rent and 30% of the remaining salary on food. After this expenditure, he is left with ₹4,200. What is his total monthly salary?
(a) ₹6,000 (b) ₹7,500 (c) ₹8,400 (d) ₹10,000
6. A is twice as good a workman as B, and together they finish a piece of work in 14 days. In how many days can A alone finish the work?
(a) 18 days (b) 20 days (c) 21 days (d) 24 days
7. A 120-meter-long train is running at a speed of 90 km/hr. It will cross a railway platform 230 meters long in:
(a) 12 seconds (b) 14 seconds (c) 16 seconds (d) 18 seconds
8. The product of two numbers is 2160, and their HCF is 12. The LCM of the numbers is:
(a) 72 (b) 180 (c) 25920 (d) 120
9. Find the greatest number that will divide 43, 91, and 183 to leave the same remainder in each case.
(a) 4 (b) 7 (c) 9 (d) 13
10. A man sold an item for ₹7200 and incurred a loss of 20%. At what price should he have sold the item to make a profit of 10%?
(a) ₹9000 (b) ₹9500 (c) ₹9900 (d) ₹10800.

11. In what time will ₹10,000 at 4% per annum produce the same interest as ₹8,000 does in 5 years at 5% per annum?
(a) 3 years (b) 4 years (c) 5 years (d) 6 years
12. A person travels from P to Q at a speed of 40 km/hr and returns by increasing his speed by 50%. What is his average speed for both trips?
(a) 45 km/hr (b) 48 km/hr (c) 50 km/hr (d) 52 km/hr
13. The true discount on a bill of ₹540 is ₹90. What is the banker's discount?
(a) ₹100 (b) ₹108 (c) ₹110 (d) ₹112
14. What is the least value that must be given to * so that the number 517 * 324 is completely divisible by 3?
(a) 0 (b) 1 (c) 2 (d) 3
15. In what ratio must a grocer mix wheat at ₹2.04 per kg and ₹2.88 per kg to make a mixture worth ₹2.52 per kg?
(a) 3:2 (b) 2:3 (c) 3:4 (d) 4:3
16. A can do a piece of work in 15 days, and B can do it in 10 days. How long will they take to do it together?
(a) 5 days (b) 6 days (c) 8 days (d) 12.5 days
17. The price of an article is increased by 20%. By what percentage must a user reduce the consumption of the article so that the expenditure on it remains the same?
(a) 20% (b) 25% (c) 16.67% (d) 33.33%
18. The value of $4\frac{1}{2} \times 2\frac{3}{4}$ is
(a) $8\frac{1}{2}$ (b) $11\frac{1}{4}$ (c) 12 (d) $10\frac{1}{2}$
19. Ram, Shyam, and Kamal start a business in partnership. The ratio of their capitals is 3:4:7. If their annual profit is ₹21,000, what is Kamal's share in this profit?
(a) ₹9,000 (b) ₹10,500 (c) ₹12,000 (d) ₹14,000
20. A boat can travel at a speed of 13 km/hr in still water. If the speed of the stream is 4 km/hr, find the time taken by the boat to go 68 km downstream.
(a) 3 hours (b) 4 hours (c) 5 hours (d) 6 hours
21. What is the least number that must be subtracted from 1989 to make it a perfect square?
(a) 45 (b) 53 (c) 36 (d) 65
22. Arrange the following numbers in ascending (smallest to largest) order: $\frac{4}{5}$, 0.83, $\frac{7}{9}$, 0.75.
(a) 0.75, $\frac{7}{9}$, $\frac{4}{5}$, 0.83 (b) $\frac{7}{9}$, 0.75, $\frac{4}{5}$, 0.83 (c) $\frac{4}{5}$, 0.75, $\frac{7}{9}$, 0.83 (d) 0.75, $\frac{4}{5}$, $\frac{7}{9}$, 0.83
23. A car travels from city A to city B at a speed of 40 km/hr and returns from B to A at 60 km/hr. What is the average speed for the entire journey?
(a) 48 km/hr (b) 50 km/hr (c) 52 km/hr (d) 55 km/hr

24. A train 150 m long is running at 68 km/hr. In what time will it take a man who is running at 8 km/hr in the same direction as the train?
(a) 8 seconds (b) 9 seconds (c) 10 seconds (d) 12 seconds
25. If $9 : x$ is equivalent to $x : 4$, then the positive value of x is:
(a) 36 (b) 6.5 (c) 5 (d) 6
26. The sum of the present ages of a father and his son is 60 years. Six years ago, the father's age was five times the age of the son. What will be the son's age in 6 years from now?
(a) 14 years (b) 20 years (c) 22 years (d) 26 years
27. A watch that gains 5 seconds in 3 minutes was set right at 7 a.m. In the afternoon of the same day, when the watch indicated a quarter past 4 o'clock, the true time was:
(a) 4 p.m. (b) 4:10 p.m. (c) 3:50 p.m. (d) 4:05 p.m.
28. The sum of the ages of two brothers is 45 years. If the difference in their ages is 5 years, what is the age of the elder brother?
(a) 20 years (b) 22 years (c) 25 years (d) 30 years
29. Two pipes, A and B, can fill a tank in 18 and 6 hours, respectively. If both pipes are opened simultaneously, how much time will be taken to fill the tank?
(a) 4 hours (b) 4.5 hours (c) 5 hours (d) 5.5 hours
30. Find the compound interest on ₹16,000 for 2 years at 10% per annum, compounded annually.
(a) ₹3200 (b) ₹3360 (c) ₹3420 (d) ₹3500
31. What is the angle between the two hands of a clock when the time shown by the clock is 6.30 P.M.?
(a) 0° (b) 5° (c) 10° (d) 15°
32. A and B invest in a business in the ratio of 3:5. After 6 months, C enters the business with an investment equal to that of B. What will be the ratio of the profits of A, B, and C at the end of the year?
(a) 3:5:5 (b) 6:5:5 (c) 6:10:5 (d) 3:5:2
33. If January 1, 2024, was a Monday, what day of the week will January 1, 2026, be?
(a) Tuesday (b) Wednesday (c) Thursday (d) Friday
34. To pass an examination, a candidate needs to score 35% of the total marks. If a candidate scores 150 marks and fails by 25 marks, what are the maximum marks for the exam?
(a) 400 (b) 450 (c) 500 (d) 600
35. Ravi and Kavi start a business by investing ₹8,000 and ₹72,000, respectively. Find the ratio of their profits at the end of the year.
(a) 1:8 (b) 1:9 (c) 2:9 (d) 1:10
36. A boat running downstream covers a distance of 16 km in 2 hours, while covering the same distance upstream, it takes 4 hours. What is the speed of the boat in still water?
(a) 4 km/hr (b) 6 km/hr (c) 8 km/hr (d) Data inadequate

37. A shopkeeper marks his goods 30% above the cost price but allows a discount of 10% at the time of sale. What is his gain percent?
(a) 15% (b) 17% (c) 20% (d) 23%
38. 300 g of a salt solution has 40% salt in it. How much salt should be added to make it 50% in the solution?
(a) 60 g (b) 50 g (c) 40 g (d) 30 g
39. The difference between simple interest and compound interest on a certain sum of money for 2 years at 5% per annum is ₹15. Find the sum.
(a) ₹5000 (b) ₹5500 (c) ₹6000 (d) ₹6500
40. At what rate percent per annum will a sum of money double in 8 years?
(a) 10% (b) 12% (c) 12.5% (d) 15%
41. In the arithmetic sequence 4, 11, 18, 25, ..., what will be the 15th term?
(a) 102 (b) 109 (c) 116 (d) 95
42. A cistern can be filled in 4 hours by an inlet A. An outlet B can empty the cistern in 8 hours. If both A and B are opened simultaneously, then after how much time will the cistern get filled?
(a) 8 hours (b) 7 hours (c) 6 hours (d) 5 hours
43. If the price of a book is first decreased by 25% and then increased by 20%, what is the net percentage change in the price?
(a) 10% decrease (b) 5% decrease (c) No change (d) 10% increase
44. Three pipes, A, B, and C, can fill a tank separately in 8, 10, and 20 hours, respectively. Find the time taken by all three pipes to fill the tank when they are opened together.
(a) $3\frac{7}{11}$ hours (b) 4 hours (c) $4\frac{7}{11}$ hours (d) 5 hours
45. Two trains are running in opposite directions with speeds of 60 km/hr and 48 km/hr, respectively. If the length of the first train is 250 m, in what time will they cross each other?
(a) 8.33 seconds (b) 9 seconds (c) 10.5 seconds (d) Cannot be determined
46. A sum of ₹3,600 is to be divided among A, B, and C in the ratio 3: 4: 5. What is the share of B?
(a) ₹900 (b) ₹1,200 (c) ₹1,500 (d) ₹1,000
47. If the cost price of 12 pens is equal to the selling price of 8 pens, what is the gain percent?
(a) 25% (b) 33.33% (c) 50% (d) 66.66%
48. A man crosses a 600 m long street in 5 minutes. What is his speed in km/hr?
(a) 3.6 km/hr (b) 7.2 km/hr (c) 8.4 km/hr (d) 10 km/hr
49. What is the greatest four-digit number that, when divided by 12, 18, 21, and 28, leaves a remainder of 5 in each case?
(a) 9828 (b) 9833 (c) 9823 (d) 9995
50. Ajay started a business investing ₹25,000. After 3 months, Vijay joined him with a capital of ₹30,000. At the end of the year, they made a profit of ₹38,000. What is Ajay's share of the profit?
(a) ₹18,000 (b) ₹19,000 (c) ₹20,000 (d) ₹21,000